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Periodical changes of amino acid reactivity within the genetic code.

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Streszczenie

Enthalpies (delta H++) and entropies (delta S++) of activation for the reaction of 18 N'-hydroxysuccinimide esters of N-protected proteinaceous amino acids with p-anisidine were measured and free enthalpies of activation (delta G++) at 25 degrees C were calculated on this basis. A regular correlation between delta G++s and the corresponding amino acid codons was found. To obtain this correlation all the codons had to be arranged in a closed ring in which the consecutive codons were connected by one-step mutational changes. One-step mutations appeared as a regular series: 2,3,3,3,1,3,3,3,1,3,3,3,1,3,3,3,2,3,3,3. (the numbers denote a codon position in which a change took place). There were three such 'one-step mutation periods' in the ring, each containing 20 codons (in each block of 16 codons with A, U and C, in the central position and 4 codons containing G in the central position). The end of the third period (UG) and the beginning of the first period were bridged by the four codons of glycine with G in the second position. The values of delta G++ change similarly in each period, increasing upon approaching Lys, Pro, and Ile. The periodical relation between the chemical reactivities of the coded amino acids (reflected by delta G++s) and the structure of their codons could be of importance for the origin of the genetic code i.e. for selection of proper codons for the definite amino acids.

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